*Malabar Trogon* **Vol.3 (1) pp. 2 – 15**

# Heronries of Kerala

**S. Subramanya**
*PHT Scheme, `J' Block, GKVK Campus, Univerity of Agricultural Sciences, Bangalore 560 065*

Kerala, the Gods own Country, is a land of breath-taking natural beauty. Being one of the smallest states of India, Kerala comprises mainly of mountains, dense forests, stately palms, swift flowing rivers and extensive backwaters. Ornithologically, Kerala is one of the well studied states, right from the times of Frank Bourdillon (1870s-1900s) through the times of Salim Ali (1935-1969) and K.K. Neelakantan (1950-1992) (see Ali 1969, Neelakantan 1993; Pittie 2005) to the present day Internet based discussions on keralabirders@yahoogroups.com which has enlivened the birdwatching activity in Kerala, as a rapid means of information dissemination and informal discussions in recent times. With the commencement of Asian Waterfowl Census in 1987 (van der Ven 1987, Scott and Rose 1989; Perennou *et al*. 1990, Perennou and Mundkur 1991, 1992; Mundkur and Taylor 1993) to the present day well executed Vembanad Waterbird Counts (e.g. see Anon 1993, Sreekumar 2003), and the more recent publication by Sashikumar *et al*. (2005) has brought-forth an increased focus on the waterbirds of Kerala.

Very little has been published on the nesting and nesting habits of large colonially nesting waterbirds of Kerala. Probably, the first ever reference to the nesting of large colonial waterbird is by John Stewart and Frank. Bourdillon, who reported the nesting season of Purple Heron (Baker 1935) and of a small colony of Darters nesting above the Athirapuzha (Athirampally?) Falls in the Kodasheri River (Ferguson and Bourdillon 1904). But for this, and the occasional notes on the nesting of individual or a few species or nesting sites (e.g., Neelakantan 1958, 1965a,b, Neelakantan and Elamon 1984; Nair and Nair 1973, Mohankumar *et al*. 1975, Uthaman, 1990, Madhavan 2000; Rajeevan *et al*. 2004, Anon 2004a & b), there has been no detailed study of heronries in the state. The present study is a step taken in this direction, in an effort to understand the status and distribution of these nesting sites, in one of the ornithologically important state of India.

**Methods**

The details on heronries were collected by personally contacting birdwatchers in Kerala with the help of a questionnaire. Besides this, information available in published literature was reviewed and more recently, information was gleaned from the postings on keralabirder@yahoogroups.com. The information thus gathered was analyzed to discern patterns in the nesting of colonially nesting large waterbirds. The names and order of listing follow Manakadan and Pittie (2001).

The present survey was taken up as a part of a much larger nationwide effort in understanding the status and distribution of heronries in India (Subramanya 1993, 1996). What is presented in this article is an overview of the nesting habits and distribution of heronries in Kerala.

## Results and Discussion

### Nesting species

Fifteen of the 26 species of colonially nesting large waterbirds that are known to breed in Indian heronries (Subramanya 1996) namely, Great Cormorant *Phalacrocorax carbo* (GC), Indian Shag *P. fuscicollis* (IS), Little Cormorant *P. niger* (LC), Oriental Darter *Anhinga melanogaster* (OD), Night Heron *Nycticorax nycticorax* (NH), Pond Heron *Ardeola grayii* (PH), Little Egret *E. garzetta* (LE), Median Egret *Mesophoyx intermedia* (ME), Great Egret *Casmerodius albus* (GE), Purple Heron *Ardea purpurea* (PrH), Grey Heron *A. cinerea* (GH), Asian Openbill-Stork *Anastomus oscitans* (ObS), Wolly-necked (White-necked) Stork (WnS) and Black-headed (White) Ibis, *Threskiornis melanocephalus* (BHI) were found to nest in Kerala (Figure 1; Appendix I &II). Although, Wolly-necked (White-necked) Stork, *Ciconia episcopus* is not a colonially nesting species, it has been included in the present survey owing to it occasional habit of nesting in heronries with other species. Of the 15 species considered, the Little Cormorant has been found to nest in about 53 sites, making it the most common colonially nesting waterbird species in the state. This is followed by Pond Heron, Night Heron and Little Egret. The Oriental Darter, Indian Shag and the Median Egret nest in little over 10 sites, while the Great Cormorant, Great Egret, Purple Heron, Grey Herons and Cattle Egrets nest in less than 10 colonies, while only single nesting sites of Black-headed Ibis and Asian Openbill-Stork have been reported (Figure 1).

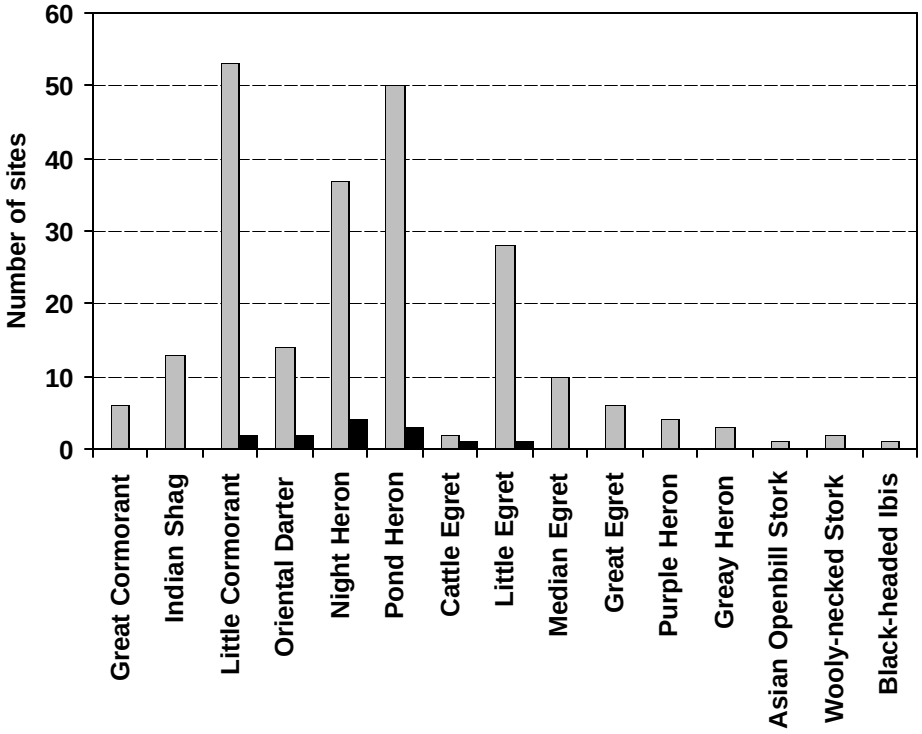


**Figure 1. Number of nesting sites of different species in Kerala**

But for a mention of Cattle Egret nesting at Kunnisseri in 1940s by Neelakantan (1965b), the discussions Keralabirder (Sashikumar, 2004b) appears to have set the record that the species does not breed within the state. However, the heronry survey has turned up two additional sites namely, Mangalavanam and Muthukoda, where the species has been seen nesting. At Muthukoda in Kozikode, Satyan Mappanur (*pers. comm.*) states to have definitely seen the species nesting in between 1993-1995, while R. Sugathan has observed Cattle Egret nesting at Mangalavanam (Appendix I). However, as rightly pointed out by Namasivayan (2004), some of these records are not verified and authenticated, nevertheless, such of these records, often are the only records to go by, and thus cannot be ignored.

The nesting of egrets has been much discussed about within Kerala. In the past, according to Salim Ali (1969), the breeding of Great Egret, Median Egret and Little Egret had not been recorded in Kerala. The first records of the nesting of egrets were reported by mid 1960 (Neelakantan 1965a, b; Mohankumar *et al*. (1975). Prof. Neelakantan (1986) later reported the breeding of the Little Egret in Kayankulam near Trivandrum, while Uthaman (1990) brought to notice the nesting of Smaller and Great Egrets nesting along with Little Egret at Nooranad, in Allaphuza district. However, today the four species of egrets have been found nesting in nearly 30 sites. An overview of these records does not necessarily report the absence of egrets in earlier decades or the changing status of these birds, but on the contrary, it is much to do with the lack of adequate reports of their nesting sites. As indicated by Sreekumar (*verbally*, 1995), this may have been due to the presence of fewer birdwatchers in Kerala in those times. With the growth of birdwatching as a hobby and the rapid mode of information dissemination through the Internet based discussion group, the birdwatchers are more aware of the bird distributions within the state. However, the same cannot be said with other birds like Asian Openbill-Stork and the Black-headed Ibis, which have been recorded nesting in recent years for the first time in Kerala.

One of the most intriguing aspects of the nesting of large waterbirds in Kerala has been that of Lesser Adjutants. Although records of the bird occurring in the state can be found from well over a centaury (Ferguson and Bourdillon 1904), no active nests of the species have been found within the state. In Kerala, the species has been recorded in recent years, though irregularly (see postings in keralabirder@yahoogroups.com), it cannot be ruled out that the species could very well be moving locally within the stretch of the Western Ghats. Unlike what is being seen of their nesting in Assam, originally, the species has been confined to nest on enormous trees within virgin forests, as seen at Cachar-Sylhet border and in the Sittang Valley in Myanmar (Baker 1935), and Sri Lanka (Hume 1890). Thus, a very small, but a viable population of this interesting species could well be breeding within the stretch of the Western Ghats and the discovery of its nesting sites within the state, would be a great ornithological challenge to the birdwatchers of Kerala.

**Distribution of Heronries**

Mapping the distribution of heronries show that not all the districts in Kerala are well represented. There are no reports of heronries from Kasaragod district. The districts of Idukki and Pattanantitta are represented by single nesting sites, Malappuram district by two nesting sites, while Ernakulam, Kottayam, Allapphuza and Kollam districts are represented by three each and four nesting sites, respectively (Appendix I&II; Figures 2&3). Maximum numbers of heronries are reported from Palakkad districts, followed by those from Thrissur, Trivandrum and Kozikode districts with 8-14 sites. Less than ten sites have been recorded from Kannur and Wyanad districts (Appendix I&II).

This however, may not really reflect the true heronry situation in these districts, as more intensive searches (e.g. Anon 2004b) may bring to light more nesting sites in different parts of Kerala.

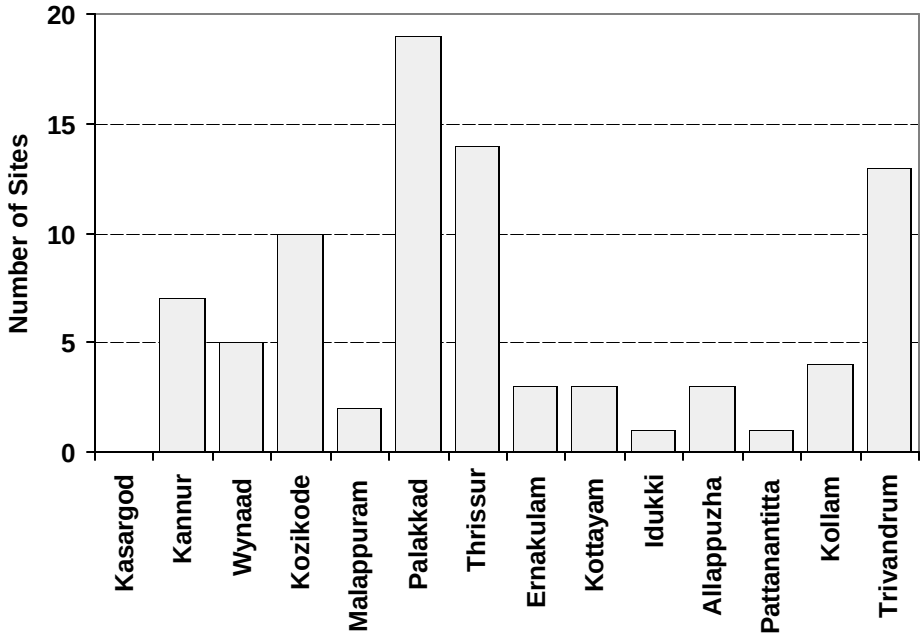


**Figure 2. Number of heronries in different districts of Kerala.**

Physical features demarcate the state of Kerala into four natural divisions (Iype *et.al*. 1991). They are the alluavial coastal lowlands adjoining the sea, the midlands consisting of the undulating lateritic plateau and foothills east of the lowlands, and the highlands, mid elevations of forest-clad hills, which in turn is bordered by high ranges on the extreme east. The presence of a large number of coastal wetlands (backwaters and Kole wetlands) is a characteristic feature of the lowland bordering the sea. The alluvium is abundantly developed in the area of lagoons and backwaters, the largest of which widens into the Vembanad Lake to the south of Kochi. The midland region comprises valleys, punctuated here and there by isolated hills. Expansive stretches of paddy fields can be seen in both lowland and the midlands. When one looks at the distribution of heronries in accordance with these natural divisions, we find that a great majority of the heronries (70%: Table 1, Figure 3) are found in lowlands, falling inline with the occurrence of wetlands in these region.

**Table. 1. Distribution of Heronries in different regions of Kerala**

| Region | Elevation | Per cent sites |
|---|---|---|
| Lowland | 0-75 | 70 |
| Midland | 76-500 | 23 |
| Highland | 500-700 | 5 |
| High range | 700> | 2 |

N=84 sites

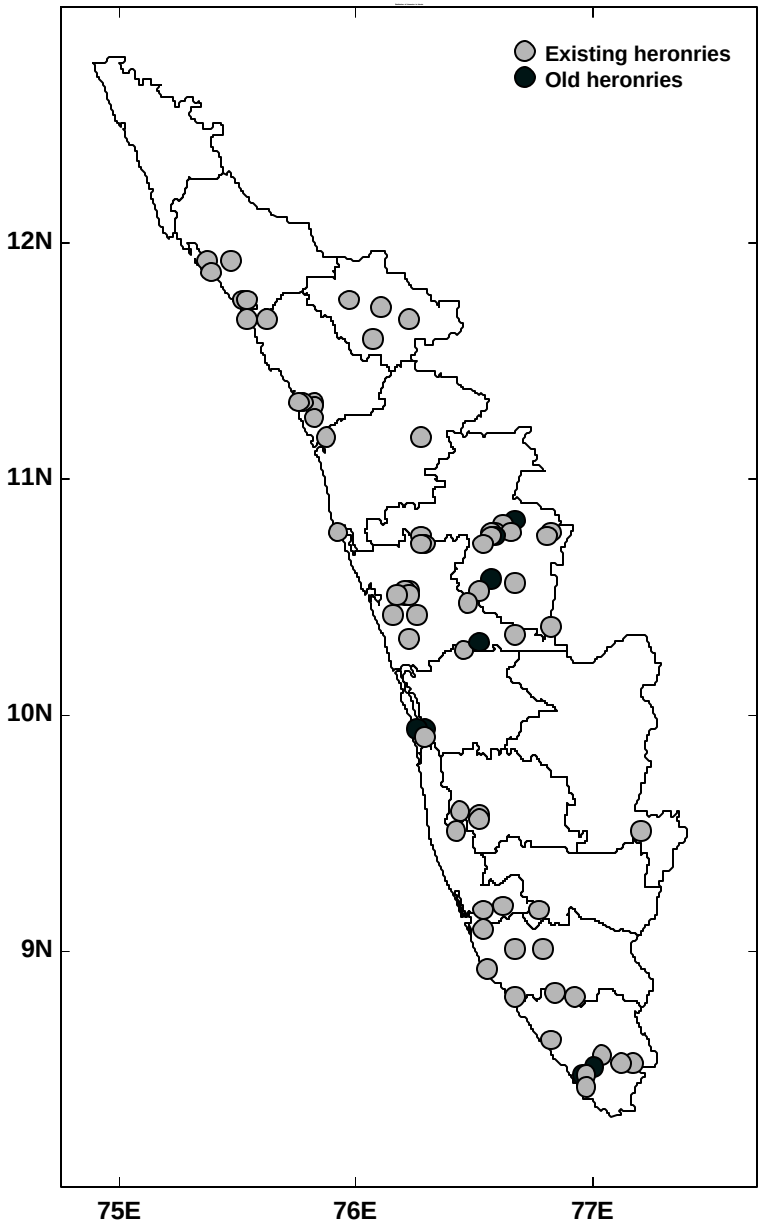


**Figure. 3. Distribution of Heronries in Kerala**

Geographically, Kerala is a narrow strip of land wedged between the Arabian Sea and the Western Ghats, which has created a kind of insularity. Owing to this insularity, Kerala has seldom been given to the invasions of large waterbirds in the past, which otherwise are more common in the neighbouring states of Tamil Nadu and Karnataka. It has taken nearly three to four decades before some of the pelican, cormorants, ibises and storks have been recorded in considerable numbers in Kerala, let alone them breeding in the state. For example, the occurrence of Large Cormorant, not a very common species during the times of Frank Bourdillon, H.S. Ferguson and Salim Ali, are more common now, with the species breeding in about 6 sites (Figure 1). In fact, the Great Cormorant is known to be a recent colonist recorded in the state only after 1981 (Neelakantana *et al*. 1993). As

Neelakantan (1958, 1965a) rightly pointed out, this invasion of certain large waterbirds has been made possible due to the construction of large reservoirs under the hydroelectric and irrigation projects. Another species that is increasingly becoming common in the state is the Indian Shag (Neelakantan *et al*. 1993), which has been recorded as nesting in 13 sites (Figure 1). The recent discovery of the nesting of Black-headed Ibis and Asian Open-bill Stork in 2004 does reflect the changing status of these groups of waterbirds. Given this changing scenario, it is only a matter of time that, before other large waterbirds like the Spotbilled Pelican, Painted Stork, Spoonbill and Black Ibis can find suitable nesting sites to put Kerala on their nesting maps.

Creation of large reservoirs as a part of river valley projects appears to have had a telling effect on the nesting of certain large waterbirds in Kerala, particularly with Darters and cormorants. The partially submerged tree trunks in midst or tail-end of the reservoirs have attracted these birds to build nest on them, owing to safety provided by the insulating spread of water: as seen at Malampuzha, Periyar and Perambikulam Reservoirs. Although Darters appeared to be the first colonists of such unique nesting conditions (Neelakantan 1958, Nair and Nair 1973, Robertson and Jackson 1992), the scenario appears to be changing with the Darters being edged out by Large Cormorants (Robertson and Jackson 1992; Neelakantan *et al*. 1993), probably owing to better competing ability.

Further, the long chain of hills of the Western Ghats is only broken by the Palghat Gap, a traverse valley that stretches for about 25 km, and which is bordered on either side by the Nilgiris and Anamalais, that emerge above the chain of ghats by several hundred feet. The unique character of this gap, which is continuous with the plains of Coimbatore is that, the land has been converted into extensive paddy fields which form one of the principal feeding grounds for the nesting birds in the area. The effect of the gap is similar to that of Krishna and Godavari gaps in the Eastern Ghats with respect to the increased densities of heronries it supports (see Subramanya 2001; Figures 2 & 3) indicating that the large waterbirds clearly avoid the elevations of the hills for nesting. But the notable, exception to this are the members of Phalacrocoracidae, that have adapted to nest on partially submerged tree trunks in reservoirs and a single nesting colony of Grey Herons that nest along the shores of Perambiculam Reservoir (Isabella Martinaz and Andrew Eliott, *pers. comm*. 1993).

Peculiarities in the distribution of certain large waterbirds does occur in the state. All the known nesting sites of Large Cormorant and the Darter have been recorded only in southern Kerala, south of Malappuram district. Although, the real reason for the distribution these two species is not clear, it may well be tied to occurrence of suitable feeding grounds within the state.

**Nesting sites**

The details of nesting sites that occur in deferent districts along with the species nesting in them and their status is given in Appendix I and II. Of the 85 sites on which information is available, nine sites are no longer active and the rest have been known to be active over the last 10 years.

As it can be seen from Table 2, little over 75 per cent of the nesting sites are found within or close to human habitation with only 20 per cent of the sites in and around the wetlands. Although, this increasing pattern of nesting in human habitation is considered to be a result of shrinkage of wetlands due to development and destruction of associated mangroves (Anon 1994), as seen elsewhere in the

country, birds tend to nest within or close to human habitation to as a matter of safety, possibly to seek refuge from ground predators (Lack 1968).

**Table 2. Sites preferred by colonial nesting waterbirds in Kerala**

| Type of nesting site | Frequency (%) | Name of the heronries |
|---|---|---|
| Within human habitation | 63 | Pamburuthi Island, Thazhechovva, Kuyyali-Thalassery, Meethale Peetika Dharmadom, Kudukkimotta, Kanhirode, Allanthuruth, Tharuvana, Arattuthara, Valliyurkavu, Meenangudi, Balussery Hospital, Eranhippalam, Annakulam, Cheruthi Road, Ayanchery, Meenchanda, Kanjikode, Sultanpet, Melamuri, Selvapalayam, Palakkad KTC Bus Stop, Kuttiupuram, Kunisseri, Alathur Bus Stand, Keerankulangara, Casino Hotel Compound, Thrisuur Zoo, Sahitya Academy compound, Mathrubhumi compound, Deepika Dailies compound, Kallettumkara, Kollangode, Ernakulam, Ravipuram Temple, Kottayam KSRTC Station and PWD complex compound, Kottayam Manipuzha, Junction Nooranad, Kattanam Hospital Compound, Pazhakulam, Kandachira, Kotakara Govt. Polytechnic campus, Kadakkal, Channankara, Pachira & Andoorkonam, Kanyakulangara, Vellanad, Vazhayila-Peroorkada Church, Vattappara, Ulloor, Vaniambalam Village, Manacaud, Charanathukavu Edagraman |
| Close to human habitation | 14 | Ramanattukara, Manthakkad, Kadukkankunnam, Chedayankalai, Manali, Koduvally, Vattekkad, Veliyannur, Vadakkanchery, Mangalavanam, Mavakkode |
| River bank | 1 | Panamaram |
| Within Reservoir | 5 | Malampuzha, Chimmoni Reservoir, Perambikulam Reservoir I, Periyar Lake |
| Close to Reservoir | 1 | Neyar Dam Gardens |
| Trees along reservoir shore | 1 | Perambikulam Reservoir II |
| Island amidst a wetland | 5 | Athirapuzha (Athirampally?) Falls, Peppara, |
| Backwaters | 4 | Akkulam Purple Heron Colony |
| Coastal Island | 1 | Pathiramanal Island |
| Within rubber plantation | 1 | Muthukoda |
| Amidst cultivation | 4 | Kole Wetland, Chenam, Allanthruth |

Often nesting within or close to human habitations has it own disadvantages. Usually, the people living close to the trees used by nesting birds are quite tolerant initially, but once the effect of the stench that emanates from the defecations and the rotting remain of the fish and nestlings that fall down from the nests above, will have a repulsive effect on people. More often, this results in part of the trees used being pruned and even completely removed to discourage nesting birds (Subramanya 1996). At Nooranad, to discourage and scare away the nesting birds, people have been known to hang large tins on the treetops for making sounds (Mavelikara 2002).

**Nesting seasons**

Based on the available information, nesting seasonality of birds in heronries is presented in Figure 4 and Appendix I and II. The majority of species considered, are monsoon nesters, while nesting late in the monsoon season is seen with the storks and ibis. Cormorants, Darter, Night Heron and Woolly-necked Stork are known to nest during winter and summer months, The cormorants, Darter and Night Heron nest both during monsoon and winter-summer seasons in the state and thus, appear to breed right through the year. Although, this is a preliminary analysis with meager nesting data, a true pattern may emerge when more detailed heronry inventories are developed for the state.

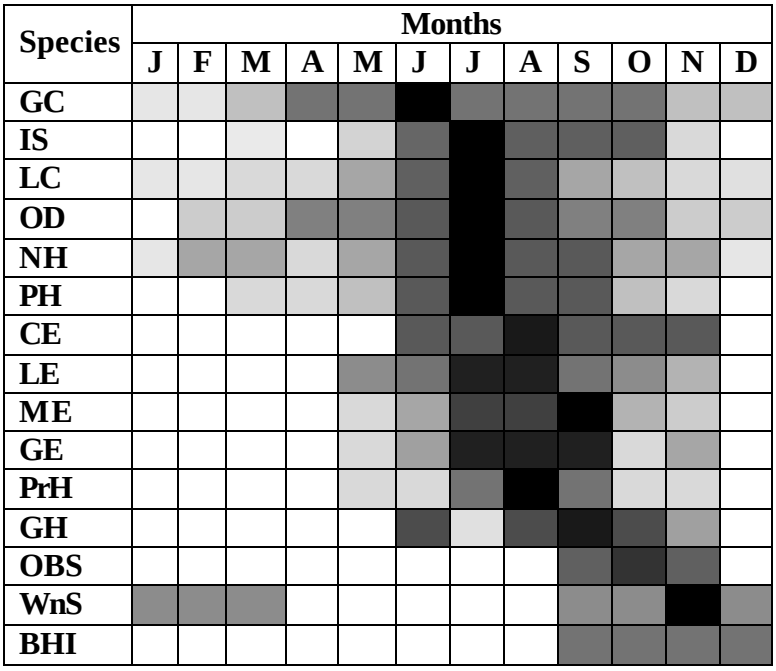


**Figure 4. Nesting seasons of different species breeding in the heronries of Kerala.** The darkest area indicates peak nesting activity.

**Size of nesting colonies**

Very few large heronries occur in Kerala. A majority of the heronries in the state are single species nesting sites or with fewer nesting species (Figure 5). Large heronries with more than six species are very few and are represented by Kumarakom, Nooranad and Mangalavanam. Nearly 20 medium sized colonies with three to five species can be seen in the state. The larger colony size with higher number of nesting birds appears to be purely a function of age, largely dependent on the quality of protection that the nesting sites enjoy (Subramanya 1996).

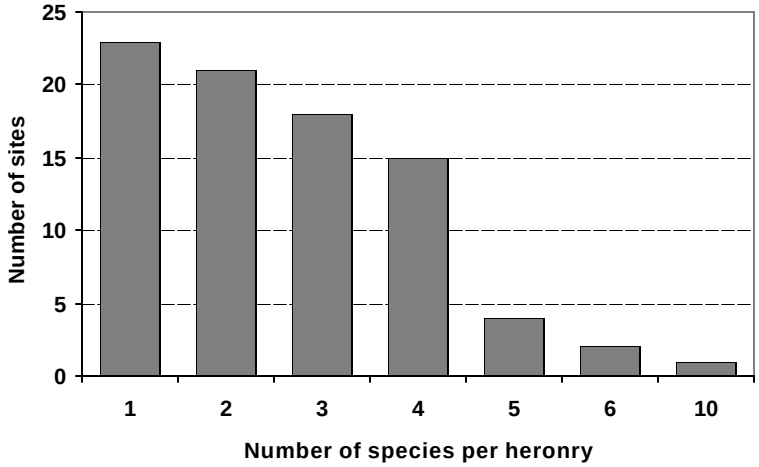


**Figure 5. Number of species nesting in the Heronries of Kerala**

**Table 3. Top 10 Heronries of Kerala**

| Name of the site | No. Species | No. Birds |
|---|---|---|
| Junction Nooranad, Allappuzha | 2(9) | 200 (10,000) |
| Kumarakom Heronry | 10 | 5,000 |
| Kattanam | 5 | 2000 |
| Pazhakulam | 6 | 1500 |
| Pamburuthi Heronry | 4 | 1500 |
| Kottayam KSRTC station/ PWD complex compound Heronry | 4 | 1220 |
| Chimmoni Reservoir Heronry | 3 | 550 |
| Thalasserry NH17 Heronry | 2 | 450 |
| Neyyar Dam Gardens | 3 | 300 |
| KTC Bus Stop Heronry /Chenam | 4 | 200 |

Based on the information gathered, Table 3 lists the top ten heronries in Kerala. Among the list of heronries reported in this article, two of the sites namely, Kumarkom and Nooranad heronries stand out as top heronries both with respect to the number of nesting species and also bird numbers. Unfortunately, the survival of Nooranad heronry, once considered to be the largest in the state is under threat, with drastic decline in the number of birds nesting at the site (Anon 1994; Mavelikara 2002, 2004). Given adequate protection, over the years, even a small heronry can grow in size, both with respect to the number of nesting species and birds (Subramanya 1996). Thus, if concerted efforts are taken to implement suitable conservation measures, the attractiveness of these sites can be enhanced.

**Conservation of Heronries**

One of the dramatic declines in the birds breeding at a heronry is seen at Nooranad. From being one of the largest heronries of Kerala, spread along a road stretch of nearly a kilometer (Anon 1994), with nearly 10 nesting species (Appendix I), the situation has changed to only Darter and the Little Cormorants breeding in reduced numbers in recent years (Mavelikara 2002). Although people were initially tolerant to the nesting of these birds, the stentch that emenates from defecation and rotting remains of fallen fish from the nests above produce an absolute repulsive effect on people. In an effort to keep the birds away the trees used for nesting have been cut down as seen at Uloor and Nooranad. At Nooranad, to repel nesting birds from trees, people have resorted to tying tin cans to the branches within the nesting canopy. Although, the pathetic state of the site has been a grave concern to birdwatchers in the state (Anon 1994, Sashikumar 2001b, Mavelikara 2002, 2004), the point that one should keep in mind is that, the very fact that the heronry is still struggling to survive is an indication that the vast feeding areas that once spurred the birds to nest in such large numbers, still exist. A determined conservation action with by local NGOs with the involvement of local community, still holds the potential possibility of reviving the site.

As observed elsewhere in India, many of the heronries have started as roosting sites (Subramanya 1996), as the basic requirements of both the roosting and nesting sites of large waterbirds are almost the same. Also, to commence with, most of the heronries start as small nascent breeding colonies with fewer nesting birds. Given adequate protection, the colony grows in size, both in terms of number of nesting species and their numbers. One of the best examples of this phenomenon is the Simpson Estate heronry in Sembium, Tamil Nadu, where the concerted efforts of a single individual, Mr. V. Gurusami, has turned a small roosting colony of Night Herons in early 1960s, in to a huge heronry with over 10 nesting species and a colony size of over 10,000 birds as seen today (Subramanya 1996). Lack of protection and continued disturbance to the nesting activity of birds can spell doom to any nesting colony, as it has been seen at Nooranad. Towards this, it would be worthwhile on part of the local NGOs or even individual birdwatchers in different districts of Kerala to adopt heronries and work towards their long-term protection. Also, it would be a worthy exercise to locate all roosting sites of colonially nesting large waterbirds and earmark them for protection.

As increasingly, the heronries in Kerala are found within or close to human habitations (Table 2), there is a need to educate local people living close to these sites and involve them in conserving these sites. Toward this, local NGOs can play a big role in developing community based conservation programmes. Elsewhere, such efforts have been largely successful (see, Subramanya and Manu 1996, Manu and Jolly 2000). Protection against any form of disturbance including poaching of eggs and birds, felling or damage to trees utilized for nesting, should be prevented. Conservation programmes should consider regular planting of preferred tree species to augment the requirement of nesting substrates in future and also for the replacement of trees destroyed due to natural causes.

Wherever possible, local people living close to the heronries should be encouraged to harvest the guano that collects below the trees used for nesting by birds. For example, at the Kokkare Bellur Pelicanry in Karnataka (Subramanya and Manu 1996), every year during the nesting season, local villagers regularly spread farm yard refuse, hay, dung and several cart loads of soil or red earth below the nesting trees to collect bird droppings. The partially or completely decomposed guano rich manure is removed from below these trees and used for cultivation of crops. Development of a

similar practice in the villages of Kerala harbouring heronries should encourage farmers to take active part in protecting the nesting sites.

**Future of heronries of Kerala**

The information on heronries in Kerala is by no means comprehensive. Though the present heronry survey has brought to light only about 85 heronries including those that once existed, it could well be a small proportion of the true heronry scenario in Kerala. Elsewhere, intensive searches for heronries have revealed a high concentration of heronries in a single district (Subramanya 1996). The mid-winter waterfowl census estimates of large colonial nesting waterbirds and Kole wetland and Vembanad waterfowl counts (van der Ven 1987, Scott and Rose 1989, Perennou *et al*. 1990, Perennou and Mundkur 1991, 1992) show that considerable wild population of the 15 species considered in this paper, occur in Kerala. However, the nesting populations of most of these species do not match the population estimates made during these counts. Notwithstanding seasonal immigration, this only makes one realize that there could still be many more heronries that are waiting to be discovered. Considering this, concerted efforts need to be directed to develop regional inventories of heronries at district or taluk level and integrate them to project a true picture of the heronry scenario in Kerala. In this direction, individual birdwatchers, ornithologists, governmental and non-governmental agencies can contribute immensely. In addition, locating roosting and nesting sites of large colonial waterbirds should be included in the common bird programme of every birdwatcher and birdwatching NGOs in the state. In looking for heronries, it is worthwhile to explore the region around backwaters, major rivers, and reservoirs or in regions where there are extensive and increased concentration of waterbodies occur. Once the inventory has been developed, efforts should be directed to identify heronries with high density and diversity of nesting birds for long-term conservation.

**Acknowledgements**

I am very grateful to all the contributors who readily responded to my information request and readily shared the details on heronries known to them – a virtue hard to come by. I would like to make particular mention of K. Anilkumar, Praveen Jayadevan E. Kunhikrishnan, Manoj V. Nair, K. Rafeek, C. Sashikumar and C. Sushanthakumar, who patiently responded to my repeated queries. My study on Indian heronries was partially supported by a Small Conservation Grant by the Oriental Bird Club, U.K. I thank Praveen Jayadevan, C. Sashikumar and Aasheesh Pittie for their constant support.

**References**

1. Anonymous. (1993): Birds of Vembanad Lake - a survey report. Nature Education Society, Trichur, Vembanad Nature Club, Muhamma, Kerala Forest Department.
2. Anonymous. (1994): Save Kerala's largest heronry. Sanctuary Asia XIV(5), 65.
3. Anonymous (2004a): More on heronries. *Malabar Trogon*. 2(3):6.
4. Anonymous. (2004b): Heronries around Kannur: Preliminry Survey. *Malabar Trogon*. 2(2):11.
5. Ali, S. (1969): Birds of Kerala. Oxford University Press. New Delhi.
6. Baker, E. C. S. (1935): *The nidification of birds of the Indian Empire*, Vol. 4. London: Taylor and Francis.
7. Ferguson, H.S. and Bourdillon, T.F. (1904): The birds of Travancore with notes on their nidification. *J. Bomby Nt. Hist. Soc*. 16: 1-18.

8. Hume, A.O. and Oates, E.W. (1890): *Nests and eggs of Indian birds*. Volume 3. Second edition. H.H. Porter, London.
9. Iype, V.C., Nybe, E.V. and Pillai, P.V. (1991): *Status report on high rang zone*. National Agricultural Research Project, Kerala Agricultural University, Thrisur.
10. Jackson, M.C.A. (1990): Random Notes on Birds of Kerala. *J. Bomby Nt. Hist. Soc*. 68:107-114.
11. Madhavan, L. (2000): Night Herons and Little Cormornts in Thrissur, Kerala. *J. Bomby Nt. Hist. Soc*..97: 142.
12. Manoj, P. (2004): help (Small Heronaries & Indian Shag). keralabirder@yahoogroups.com. Sat Nov 27, 2004 9:36 am
13. Mavelikara, H. (2002): Pityful status of Nooranad Heronry. keralabirder@yahoogroups.com. Tue Jul 9, 2002 6:01 pm
14. Mavelikara, H. (2004): Nooranad Heronry-trying to survive. keralabirder@yahoogroups.com. Mon Aug 12, 2002 2:35 pm
15. Manu, K. and Jolly, S. (2000): *Pelicans and people: The two–tier village of Kokkare Bellur, Karnataka*. Kalpavriksh and International Institute of Environmental Development.
16. Mohankumar, C., Nair, S.S.C., and Neelakantan, KK. (1975): Nesting of Little Egret: A new record for Kerala. *Newsletter for Birdwatchers* 15(7): 5-6.
17. Lack, D. (1868): *Ecological adaptations for breeding in birds*. Methuen, London.
18. Mundkur, T. & Taylor, V. (1993): Asian waterfowl Census 1993, AWB, Kula Lumpur, Malaysia and IWRB, Slimbridge, U.K.
19. Nair, N.R. and Nair, N. (1973): A note on the breeding of darters (*Anhinga melanogaster* Pennant) in the Periyar Lake. *Indian Forester* 99: 621-622.
20. Namasivayan, L (2004): Locating cattle egret nestings. keralabirder@yahoogroups.com. Sun Aug 15, 2004 10:09 am.
21. Nameer, P.O. (2004): help (Small Heronaries & Indian Shag. keralabirder@yahoogroups. com. Sat Nov 27, 2004 9:49 pm.
22. Neelakantan,KK (1958): Water birds and our irrigation schemes *J. Bomby Nt. Hist. Soc*: 55(2):360-361.
23. Neelakantan,KK (1965a): Little Egret Egretta garzetta breeding in Kerala. *Newsletter for Birdwatchers* 5(6): 8.
24. Neelakantan,KK (1965b): Breeding of Little Egret in Kerala. *Newsletter for Birdwatchers* 5(9): 9.
25. Neelakantan,KK (1984): A plea for some birds of Kerala. *Newsletter for Birdwatchers* 24(3&4): 5-8.
26. Neelakantan,KK (1986): *Keralathile Pakshikal'* (Malayalam). Kerala Sahithya Academy
27. Neelakantan,KK; Elamon,S (1984): Teals or tourism. *Hornbill* 1984(3), 20-22.
28. Perennou, C. & Mundkur, T. (1991): Asian Waterfowl Census 1991, IWRB, Slimbridge, U.K.
29. Perennou, C. & Mundkur, T. (1992): Asian Waterfowl Census 1992, IWRB, Slimbridge, U.K.
30. Perennou, C., Rose, P. & Poole, C. 1990. Asian waterfowl 1990. IWRB, Slimbridge, U.K.
31. Pillai, N.G. (1966): Occurrence of the Night Heron, *Nycticorax n. nycticorax* (Linn.) at Ernakulam, Kerala. *Newsletter for Birdwatchers* 6(4):7-8.
32. Pillai, N.M. (1983): A small but beautiful sanctuary. The Hindu: December 25, 1983:

33. Pittie, A. (2001): "PITTA # 124 August 2001. Birding Notes (Long). <keralabirder@yahoogroups. com>. Fri Aug 3, 7:39 pm.
34. Pittie, A. (2005): A Bibliographic Index to the Ornithology of the Indian Subcontinent. CD ROM Published by the author, Hyderabad.
35. Praveen, J. (2004a): help (Small Heronaries & Indian Shag). keralabirder@yahoogroups.com. Fri Nov 26, 2004 3:00 am.
36. Praveen, J. (2004b): help (Small Heronaries & Indian Shag). keralabirder@yahoogroups.com. Wed Dec 1, 2004 8:31 am
Manakadan, R. and A. Pittie. (2001): Standardised common and scientific names of the birds of the Indian Subcontinent. *Buceros* 6 (1): 1-37.
37. Manoj, P. (2004). help (Small Heronaries & Indian Shag). keralabirder@ yahoogroups.com.. Sat Nov 27, 2004 9:36 am.
38. Rafeek. K. (2001b). Purple heron nesting at Aakkulam,TVM. keralabirder@yahoogroups. com Thu, 06 Sep 2001 15:42:56 +0530.
39. Rafeek, K. (2001a): Nooranad Heronry. keralabirder@yahoogroups.com.Tue Jul 17, 2001 10:48 pm.
40. Rajeevan, P.C., Suraj, and C. Sashikumar**.** (2004): Grey Heron *Ardea cinerea* breeding in Kerala, India. *Newsletter for Ornithologists* 1 (6) (31 December): 87.
41. Scott, D.A. & Rose, P.M. (1989): Asian Waterfowl 1989. IWRB, Slimbridge, U.K.
42. Sashikumar, C. (2001a): Darter in Kerala. keralabirder@yahoogroups.com. Fri Jun 22, 2001, 6:11 pm
Sashikumar, C. (2001b): Invite ur prompt attention. keralabirder@yahoogroups.com. Tue Jul 24, 2001, 11:15 am.
43. Sashikumar, C., Palot, M.J., Meppayur, S. and Radhakrishnan, C. (2005): *Shore Birds of Kerala - Including Gulls & Terns*. Zoological Survey of India. Calcutta.
44. Sreekumar, B. (2001b): *(No subject)*. keralabirder@yahoogroups.com. Wed Oct 17, 2001 12:16 am.
45. Sreekumar B. (2003): Cormorants. keralabirder@yahoogroups.com. Fri May 16, 2003 8:14 pm.
Sreekumar, B. (2003): *Vembanad Waterbird Count 2003*. Department of Forests and Wildlife, Kerala and Kottayam Nature Society.
46. Sreekumar, B. (2004): Breeding birds at Kumarakom. *Malabar Trogon*. 2(2):7
47. Subramanya, S. (1993): Information Request: Catalogue of Indian Heronries. IWRB News. 9:11.
48. Subramanya, S. (1996): Distribution, status and conservation of Indian heronries. *Journal of the Bombay Natural History Society* 93 (3): 459-486.
49. Subramanya, S. (2001): Heronries of Andhra Pradesh. *Mayura* 13 : 1-27. (1996).
50. Subramanya, S. and Manu, K. (1996): Saving the Spotbilled Pelican: A successful experiment. Hornbill: 1996(2): 2-6.
51. Susanthkumr, C. (2004): Nesting of Asian Openbill - First record from Kerala, India <orientalbirding@yahoogroups.com>. 4 Nov 2004 12:29:31 –0000.
52. Uthaman,PK (1990): Breeding of Egrets in Kerala. *J. Bomby Nt. Hist. Soc*.. 87(1), 139.
53. van der Ven, J. (1987): Asian Waterfowl 1987: Midwinter Bird Observations in some Asian Countries . IWRB, Slimbridge, England.

## Appendix I. Details of existing heronries of Kerala

## Appendix II. Details of Heronries that once existed in Kerala

| District | Name | Neting species | Nesting Season | Source |
|---|---|---|---|---|
| | Malampuzha Heronry | OD | June-MEpt | Neelakantan (1958) |
| | Melamuri Heronry | NH,PH,LE | June-July, August | Neelakantan (1965b) |
| | MElvapalayam Heronry | LC,NH,PH | February-May | Praveen Jayadevan. |
| Palakkad | KunisMEri Heronry | CE | Not known | Neelakantan (1965b) |
| Thrissur | Athirapuzha (Athirampally?) Falls Heronry | OD | ??-MEpt | Fergusson & Bourdillon (1904) |
| | Ernakulam Heronry | NH | March | Pillai (1966) |
| Ernakulam | Ravipuram Temple Heronry | NH | Feb,March | Pillai (1966) |
| | Ulloor | LC,PH | Mar-May; MEp-Nov | C. Susanth kumar |
| Trivandrum | Manacaud Heronry | NH | Not known | Neelakantan (1984) |
| ?? | Mavakkode Heronry | LC,NH | Aug-Oct, Jan,Feb | P.K. Premavathi, |

* Abbreviations are as per text

## List of Contributors


1. Anilkumar, K., Pulimoottil Thekkethil, Nooranad P.O., Kerala 690 504
2. Dayal, K.V., Muhamma Nature Club, Muhamma P.O., Alleppy District
3. Elliott, Andy, Gombu 2, 1r, 08003 Barcelona, Cataluyana, Spain
4. Dr. Easa, P.S., Scientist, Wildlife division, KFRI, Peechi, Kerala
5. Dr. Jayson, E.A., Scientist, Wildlife division, KFRI, Peechi, Kerala
6. Kunhikrishnan, E., TC 1/2021, `Jayamanju', Kumarapuram, Trivandrum, Kerala, 695 001.
7. Dr. Kurup, Deepakumar `Nithya Sobha', Kesavan Nair Road, Poojapara P.O., Trivandrum 695 012.
8. Manoj V. Nair, 34, Thoppil Nagar, Kumarapuram, Trivandrum 695 011.
9. Mappayur, S. Bhavana Photos, P.O. Meppayur, Kozhikode 673 524.
10. Martinez, Isabel, Gombu 2, 1r, 08003 Barcelona, Cataluyana, Spain
11. Nameer, P.O., Department of Wildlife Sciences, College of Forestry, Kerala Agricultural University, 680 656. Thrissur.
12. Nelson, Thomas P.J., Wildlif Assitant, Thekkady.
13. Palot, Jafer., `Nazil Manzil', P.O. Payangadi, Kannur dist. Kerala 670 303.
14. Praveen, J., `Ambadi', 14/779(2), K.Medu P.O., Palakkad 678 013
15. Prabhakaran, P.V., Ramanthali, Kannur Dist. Kerala 670 308.
16. Mrs. Premavathi, Manager (Women's uplift), Shanthimalai – Sri Ramanashram P.O. Post Bag 7, Thiruvnnamalai 606 603, Tamil Nadu.
17. Rafeek, Khalid., Little Flower House, Kaniyapuram P.O., Trivandrum, Kerala 695 301.

18. Ravindran P.K. Vallisseriy, P.O. Avinissery, Thrissur 680 313.
19. Sashikumar, C. #9, Subhash Nagar, Kannur 670 002, Kerala.
20. Sugathan, R. Environment Research Programme, 292/16 BOC Road, Perumbevoor, Kerala 683 542.
21. Dr. Sreekumar, B., Srinilayam, near Union Club, Kottayam, Kerala 686 001.
22. Susanthkumar, C., `Prakruthi', Indiranagar, Peroorkada P.O., Trivandrum 695 005.